and Minnesota. The timber operations in the white pine forests have only one object, which is to bring as much timber as possible out of the forest in the shortest possible time, and to make money. Only the best trees are felled, and the rest burned. A forest after a timber gang has left it presents a remarkable appearance: between the standing blackened and partially charred stems of the broad-leaved and other trees which have not been felled are the stumps of the felled pines, whilst the ground is covered with wood, which would not have paid for its removal, and rots, or is burned by the annual fires.

In 1880, there were in the three lake districts 7000 million cubic feet of standing white pine timber, whilst in the last ten years 6205 millions of cubic feet have been felled and exported, 750 millions in 1889 alone. There is, therefore, little more left than can be exported in a single year. Many of the large saw-mills have already been obliged to stop work, or get timber from Canada. Chicago, which owes its rapid rise to the timber trade, imports yearly 166,000,000 cubic feet of white pine timber. This is about three-fourths of the whole forest yield of Prussia, the produce of 6,750,000 acres or 10,547 square miles of forest. Besides the Weymouth pine, *Pinus Banksiana*, the grey pine, and *Pinus resinosa*, and various broad-leaved trees are found. The sub-Arctic region of Alaska and British North America is poor in species; *Picea alba* and *nigra*, the white and black spruce, being characteristic trees.

Merely glancing at the North Mexican forest region, with forests of *Prosopis juliflora*, and grassy tracts containing gigantic cacti, and *Yucca baccata*, a palm lily, attaining 40 feet in height, we come to the Pacific forest region, where the Douglas fir, *Pseudotsuga Douglasii*, is the most important tree, and yields, in suitable localities, perhaps the greatest quantity of timber per acre of any known species.

We finally come to the red wood forests of the Pacific coast, where *Sequoia sempervirens* prevails, its congener *Sequoia gigantea* only occurring over a limited area. Unregulated fellings also prevail in the Douglas and red wood forests, and their supply cannot last much longer.

Besides the wholesale destruction of forests which goes on in America, and has already driven the United States to remove all duty from Canadian wood, the most appalling destruction is now being annually caused by the floods which pour down the slopes of the mountains, bringing down boulders, stones, and gravel on the cultivated lands below. Mayr has seen standing trees covered with mud up to a height of 15 feet in some of the Southern and Central States, whilst hundreds of magnificent trees lay uprooted in the full vigour of their growth. This can clearly be traced to the destruction of the hill forests.

How long will rulers of the United States shut their eyes to the appalling waste of the resources of their country which is still rampant! Brandis hopes that private capitalists may invest their money in forests, tempted by the rapid rise in the price of wood, and may manage them properly; but all European experience points to the necessity of State forests, and a trained State Forest Service to manage them, as the only efficacious remedy against the impoverishment of the soil and natural resources of America. W. R. FISHER.

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## *DAILY INTERNATIONAL WEATHER CHARTS.*

AT the meeting of the Meteorological Congress at Vienna in September 1873, General Myer, the Chief Signal Officer of the United States Army, submitted the following proposal:—

"That it is desirable that, with a view to their exchange, at least *one* uniform observation of such a character as to be suitable for the preparation of synoptic charts be taken and recorded daily and simultaneously at as many stations as practicable throughout the world."

Although various suggestions had been made before, and synoptic charts had been previously constructed for large areas, this proposal was a bold step in advance, as the charts hitherto published—those of the English Meteorological Office excepted—were mostly synoptic only, but not strictly synchronous, whereas the plan now proposed was to treat the whole observational area of the globe as a unit, and to represent the actual conditions existing at the same instant of physical time.

The proposal was well received, and on January 1, 1875, General Myer was able to publish his daily International Bulletin, and to supplement this, on July 1, 1878, by the daily International Weather Map. These publications were continued until the end of March 1884, after which time the daily Bulletin was discontinued, but the chart was issued on an enlarged scale, containing data referring to pressure and wind direction and force at all reporting stations in the northern hemisphere and over the northern portions of the Atlantic and Pacific Oceans, and this has been published up to the end of December 1887. We have before referred to the ability with which this great undertaking has been carried out by the Signal Service. The necessity of obtaining strictly simultaneous observations was generally acknowledged after the discovery of Buys Ballot's law of the relation between wind force and barometric pressure, about the year 1857, and it is almost entirely due to the construction of synoptic charts over large areas that so much progress has been made in weather prediction in the last quarter of a century. This progress would hardly have been possible while each country dealt exclusively with its own area, notwithstanding the great advance made over the old system of dealing with means of observations by the publication of telegraphic weather reports and weather charts. But notwithstanding the progress already made, we are still unable to foresee what may occur for more than a day or so in advance. Much more research is required, and the thousands of observations now taken on land and sea over the globe should be plotted at least once a day. We should therefore much regret the discontinuance of such work as that now before us, which deals with nearly half the globe.

To take one or two of the facts shown by the charts themselves: the very severe gale which visited these islands on December 8 and 9, 1886, in which about the lowest barometer reading on record was observed, will be remembered in connection with the capsizing of the Southport and St. Anne's lifeboats near Formby, resulting in the loss of twenty-seven lives out of twenty-nine which constituted the two crews. In a paper upon this storm, read before the Royal Meteorological Society on April 20, 1887, by Mr. C. Harding, it is stated, after a careful examination of the materials then available, that "the Atlantic was in such a disturbed condition at this time that it is not possible to track the passage of the storm across the Atlantic with any certainty." The daily International Charts, however, show the position of the storm day by day, and also that it did actually cross the Atlantic from shore to shore, and was central over the Gulf of St. Lawrence on December 3.

Another instance of remarkable weather, it will be remembered, occurred in June 1887—the Jubilee year; the weather was remarkably dry and fine in this country, there being an extraordinary drought of about thirty days. The charts for that period show that similar anticyclonic conditions also embraced a very large part of the eastern portion of the Atlantic, and extended abnormally over a portion of Europe; while the travelling disturbances are plainly shown to be confined to the American side of the ocean.

It is only Government organizations that can undertake the laborious work of producing such charts; but when they are published, the matter should not be left there: the meteorologist should make use of the materials pro-

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vided for him, and endeavour to solve the problems which underlie weather changes and the general movements of the atmosphere.

## *JOSEPH LEIDY, M.D.*

THIS well-known American naturalist was born on September 9, 1823. He very early in life showed a fondness for collecting and observing insects, one of his first contributions being a paper on the mechanism which closes the membranous wings of the genus Locusta, published in 1845 in the Proceedings of the Academy of Natural Sciences of Philadelphia. Having taken his degree in medicine, he devoted himself more and more to the study of natural history, and few men of any nation have left behind them a longer list of work done than this distinguished man, whose death we announced in a recent number. Leidy was gifted with great powers of observation, he possessed a correct eye and steady hand for the delineation of whatever objects he was observing, he was endowed with a faculty for work; and as he had also an excellent memory, one reflects upon his half-century of work with less of surprise than admiration. To give an account of his writings would be to write a volume, to give but their titles would be to fill many of our columns, so that it must suffice to call to mind rather the subjects about which he wrote than the writings. Commencing with a study of entomology, and working more at the anatomy than at the general morphology of insects, he quickly passed on to the study of the entophytic worms, his "Flora and Fauna within Living Animals," published as one of the Smithsonian Contributions in 1852, having made its mark at the time. Then he took up the fresh-water Polyzoa, his labours on which will be understood only when a monograph on this group as inhabiting America comes to be published. Leaving for a time the study of invertebrate forms, he next entered on the field of research among the fossil vertebrates, describing in quick succession a number of remarkable fossil reptiles and fish, and he was the author of the first volume of the quarto series of reports issued by the United States Geological Survey of the Territories, under the title of "Contributions to the Extinct Vertebrate Fauna of the Western Territories." It was during his journeys to the Western Territories, that, not content with investigating the fossil vertebrates of the district, he worked very diligently at the study of the microscopic forms of life which inhabit the waters met with therein, and these researches, so far as one group of animals is concerned, were happily published by the United States Geological Survey in 1879, in one large quarto volume, "The Fresh-water Rhizopods of North America," which is illustrated by forty-eight coloured plates after Leidy's own drawings. This work on its appearance was received with great enthusiasm, and is still a worthy model for a monograph. During all these years, and amid so many and so varied labours, Leidy still discharged his duties as Professor of Anatomy to the University of Pennsylvania, and also of teacher of natural history to the classes of boys and girls at the Swarthmore College. No doubt many of these latter pupils will now call to mind the warm personal interest their master always took in their labours. In one of his books he tells us that since he was fourteen years of age the study of natural history was to him a constant source of happiness; but that on this joy a shadow was constantly cast when he thought how few, how very few, of those around him gave any attention to intellectual pursuits of any kind, and it saddened him to feel that the command "that man shall not live by bread alone" remained so unappreciated by the great mass of even so-called enlightened humanity. The results of Leidy's intellectual pursuits will long remain to testify to the manner of man that he was.

## *THE SCIENCE MUSEUM.*

THE discussion on this all-important question continues in the press. The Whitsuntide holidays have prevented any questions being asked in the House of Commons, where the feeling is very strong against the action of the Government.

As before, we reprint the most important items in the discussion. These consist of letters from Sir H. Roscoe and Profs. Armstrong and Ayrton to the *Times*. We commend to our readers the reference by the latter to Mr. Goschen's treatment of the deputation, and also their judgment as to the present position of science in this country, and the teaching of it in London, as compared with Göttingen and Zürich. No one can speak with greater authority than Profs. Armstrong and Ayrton on this subject.

Our administrative system, however, is such that the present question, which is acknowledged to be of such high importance, is being settled exclusively by officials who are quite ignorant of science. This is not said to their disparagement: it is only a statement of fact. The letters run as follow:—

ONE cannot but feel much sympathy for Ministers, on the one hand pressed by the advocates of scientific and technical education, and on the other nervous at the prospect of not securing the gifts of the munificent but somewhat *exigeant* art donor. But the question is so vitally important from the point of view of science that I feel sure no excuse is necessary if I urge most strenuously that an irrevocable step be not taken without full and careful consideration; and, further, that a definite scheme for providing for the science collections and Science School be formulated before what many of us believe to be a most unwise interpolation of an art gallery, on land which when bought was universally believed to have been acquired for scientific ends, is finally decided on.

At the present moment it is impossible to say under which thimble the scientific pea is housed, and it was no doubt due to this that the discussion which the deputation had with the Chancellor of the Exchequer and Lord President of the Council on Tuesday last was to some extent abortive.

The Chancellor of the Exchequer, in reply to myself on March 18, said:—

"It would be possible to make adequate provision for chemical and physical laboratories on the land between the Imperial Institute Road and the Technical Institute. This site adjoins the east galleries, and it is in these galleries, together with the west and southern galleries, and a proposed cross gallery joining the east and west galleries, that the science collections may ultimately be housed."

But by April 15 the impracticability of the scheme of putting part of the Science School at the south end of the eastern gallery seems to have been discovered. For on that day Mr. W. H. Smith, in reply to Mr. Mundella, propounded another scheme for the Science School, while leaving the collections to be housed in the east and west and cross galleries. He said:—

"A portion of these vacant lands" (facing the Imperial Institute) "can be utilized for the extension of the College of Science and for future growth of the science collections. Additions to the College of Science must in any case take the form of a separate building, divided from the present building by Exhibition Road; and, as access to the lands mentioned above from Exhibition Road will be secured by means of a corridor, the interposition of the Gallery of British Art need have no more serious effect than to increase by some 60 yards (which will be under cover) the distance between the two portions of the Science College."

By the former plan a portion of the Science School would no doubt have been in immediate contact with the splendid picture galleries in which the science objects were to be housed; but it would be far removed from the other part of the school—the Exhibition Road thus becoming a school of peripatetic philosophy. By the latter scheme the two parts of the school would be brought somewhat closer together—less of Exhibition Road and more of covered corridor—but then both portions would be entirely separated from the science collections—two roads to cross, and a walk of half a mile, or thereabouts, to the further part.

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